

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions of claims in the application.

1. (Original): A method for nondestructive inspection of grain-boundary attack due to thermal sensitization in a chromium-containing nickel-based alloy, comprising:

measuring a saturation magnetization $M_s(T_i)$ of a test piece at each of a plurality of measuring temperatures defined by equally dividing a given measuring temperature range in the range of a minimum to a maximum of Curie temperatures corresponding to respective chromium concentrations in a chromium impoverished region of said alloy; and

calculating $[[vk]] \ v_k$ according to the following formula (1) to quantitatively determine the volume of the chromium impoverished region in a divided manner on the basis of the chromium concentrations:

$$M_s(T_i) = \sum_{k=1}^i \frac{v_k M_k(T_i)}{V} \quad (1),$$

wherein: $[[vk]] \ v_k$ is the volume of the chromium impoverished region having a chromium concentration C_k ;

V is the volume of said test piece;

k is a natural number to be determined in conjunction with dividing the range of a minimum measuring temperature T_{\min} to a maximum measuring temperature T_{\max} , into n equal parts, in conformity to measurement conditions; and

$M_k(T_i)$ is a saturation magnetization at a measuring temperature T_i in the chromium impoverished region having the chromium concentration C_k , said saturation magnetization being obtained in advance ~~based on the following data (a), (b) and (c): (a) the relationship between saturation magnetization and chromium concentration at an absolute temperature of 0 (zero) K in the chromium impoverished region; (b) the relationship between Curie temperature and chromium concentration in the chromium impoverished region; and (c) the relationship between saturation magnetization and measuring temperature in the chromium impoverished region.~~

2. (Original): An apparatus for detecting magnetic characteristics of the test piece for use in the method as defined in claim 1, comprising:

a cooling-medium tank for containing a cooling medium;

a test-piece housing disposed at the central region of said cooling-medium tank to receive said test piece therein;

an exciting device mounted on the inner wall of said test-piece housing to excite said test piece;

a support member for supporting said test piece in such a manner that it is located at the center position of said exciting device;

a magnetic flux detector disposed around said test piece;

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a cooling device for supplying a cooling medium to said cooling-medium tank to circulatingly cool said test piece while allowing cooling gas generated from said cooling medium to flow into said test-piece housing;

a heating device disposed below said test piece to heat said test piece; and

means for controlling the measuring temperature of said test piece through the use of said cooling medium and said heating device.